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Analysis of publications on surgical gloves

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ABSTRACT

Aims: This bibliometric analysis aimed to examine the trends and characteristics of publications related to surgical gloves. The study analyzed articles retrieved from the Elsevier Scopus database, focusing on topics such as the history of glove usage, the importance of sterility, glove punctures, and advancements in glove designs.

Methods: The data in this study were obtained by searching the Elsevier Scopus database. The search was selected from records containing the keywords in the title "surgical gloves" and a single day was chosen for the sake of being unbiased. In this study, only the articles were analyzed and the online library and digital resources of Çanakkale Onsekiz Mart University were used. Scopus' visuals were used for visualization after data analysis.

Results: A total of 568 publications were included in the analysis, consisting of articles, letters, reviews, and other study documents. The majority of articles were written in English, and the top three countries in terms of publication output were the United States, United Kingdom, and Germany. Medical journals accounted for the largest share of publications, followed by nursing journals. Notably, there was a rising trend in the number of studies on glove punctures and advancements in glove designs. Richard F. Edlich from the University of Virginia School of Medicine emerged as the most productive author, and the Association of periOperative Registered Nurses (AORN) Journal was the most prolific journal in this field.

Conclusion: Today, studies on surgical gloves; focuses on latex glove allergy and surgical site infections. These studies: It is important for the prevention of infection during surgery in the future and the prevention of infectious diseases in healthcare workers.

Keywords: Surgical gloves, bibliometric analysis, sterility, glove punctures, latex allergy gloves

INTRODUCTION

Gloves have been utilized in surgical procedures for about 100 years.1 The end of the 1800s saw a widespread adoption of gloves. Gloves were mostly worn during this time to safeguard the surgical crew from infected patients. However, following the 1900s, the focus on the use of sterile gloves and the goal of employing surgical gloves changed from preventing microbiological contamination of the surgical field to protecting the surgical field from contamination.[2,3]

Surgical gloves offer reliable protection as long as they are not punctured. The surgical team runs the danger of contracting infections like hepatitis B and AIDS that are spread percutaneously when gloves are punctured during surgery.1 The requirement to safeguard the surgical team from diseases that can be transmitted through blood and body fluids during surgery has been highlighted by the rising prevalence of diseases including Hepatitis B, Hepatitis C, and HIV/AIDS that can be contracted through blood and bodily fluids.[3,4]

The risk of transmission via glove punctures, which are common during surgery, has been addressed in recent years. Studies have looked into the effects of employing double gloves rather than single gloves on glove puncture, and new glove designs have been created for procedures involving the frequent use of sharp instruments.[3-5] The length of the surgery and the frequency of glove punctures are related, according to some writers, who indicate that longer surgeries result in more punctures.[6,7]

We wanted to look at how all of these developments affected the scientific literature in our study.

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METHODS

Bibliometric data analysis method was used in this study. The data in this study were obtained by a search conducted on the Elsevier Scopus database. The journals indexed in the Elsevier Scopus database were included. The Scopus database covers peer-reviewed journals in different disciplines (health sciences, social sciences, life sciences, physical sciences, etc.).

In this study data was retrieved from the beginning of records until October 19.2021 containing the keywords in the title "surgical gloves" typed into the search box of the basic research. Only articles were analyzed.

The searches were performed on a single day October 19, 2021, to avoid bias since the database is still open and has daily updates. The graphics of the Scopus were used for visualization and also to create graphics Microsoft Office 2010 program was used. The articles were sorted by the countries, authors, journals, affiliations, publication date, and most productive journals on surgical gloves and citation analyses of this journals also analysed. Canakkale On Sekiz March University's online library and digital resources were used to access information.

Ethics Approval

Since this was not human or animal study, approval from the ethical committee was not requested. The study was conducted in accordance with the Declaration of Helsinki revised in the year 2013.

Statistical Analysis

In the study, all the data were given in percentages, numbers, and bar charts.

RESULTS

Five hundred sixty-eight publications met inclusion criteria. 441(75.25%) of them articles, 70(11.94%) of them letters, 31(8.03%) of them reviews and 32 other study documents (27 note, 8 conference paper, 4 short survey, 3 editorial and 2 erratum). Only articles (n=441) were analyzed. The first article was published in the year 1940 The article numbers by years were given in **Figure 1**.

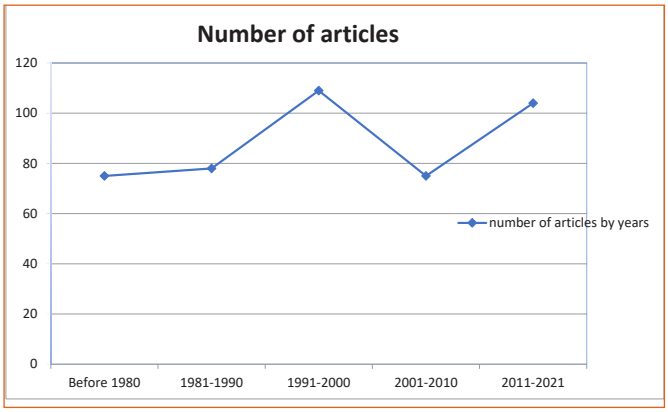

Figure 1. Articles by years.

Most of the articles were written in English (n=369, 83.67%). Also German, French, Japanese, Spanish, Italian, Portuguese, Russian, Dutch and Hungarian were top preferred languages.

The majority of articles (n=108, 24.48%) were produced by authors from institutions based in the United States of America (USA), while United Kingdom and German were among the top three countries. Japan, Austria, France, Italy, Australia, Brazil and Canada were also in the top ten countries. Turkey and India ranked 11th.

58 (13.15%) of the articles were published in open access (AE) (Open Access) journals (23 Gold, 2 Hybrid gold, 24 bronze and 35 green OA journals). The most frequent keywords were 'Gloves, Surgical' (n=314), 'article (n=313), 'surgical glove' (n=303). Most of the articles were in the area of medicine [n=373(84.58%)] and nursing [n =27(6.12%)]. Also 21 in different science areas such as engineering, environmental science and veterinary. 420 (92.23%) of the publications were not funded by any institution.

Top 3 funding sponsors were National Institutes of Health [n =6], The United States Department of Health and Human Services [n =6] and Centers for Disease Control and Prevention (CDC) [n =4].

Most of the publications were from University of Virginia (USA) [n =20], University Medicine Greifswald (Germany) [n=9], Medical University of Vienna (Austria) [n=8] and Medical College of Wisconsin (USA) [n=6]. The publications were from over than 100 affiliations but number of publicaitons were lower than [5].

Richard F. Edlich from University of Virginia School of Medicin (Charlottesville, USA) was the most productive author.

Most productive journals on surgical gloves and citation analyses

The highest number of articles were published in the journals of the Association of periOperative Registered Nurses (AORN) Journal [n =9, 2.04%], Contact Dermatitis [n=8, 1.81%] and Journal of Hospital Infection [n=7, 1.58%].

The citations numbers by years of the most publishing 10 journals on surgical gloves have been rising by years. The citations numbers by years of the most publishing 10 journals on surgical gloves were given in **Figure 2**.

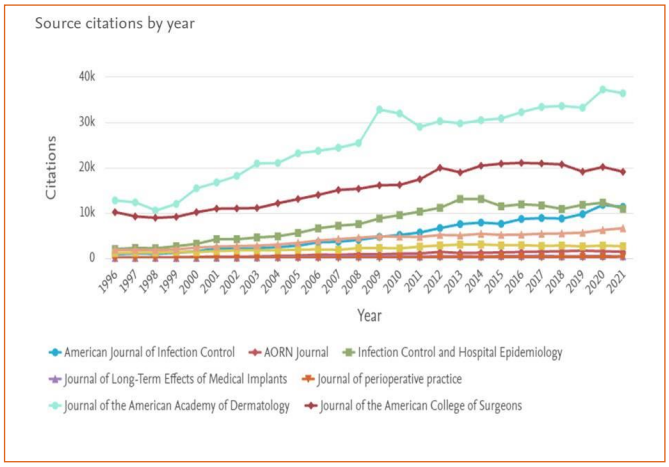

Figure 2. The citations numbers by years of the most publishing 10 journals on surgical gloves.

121 of the articles were not cited yet. Susan M. Tarlo from Toronto Western Hospital University of Toronto (Canada) was the most cited author (**Table 1**).

DISCUSSION

Scopus delivers the broadest coverage of any interdisciplinary abstract and citation database. Covering 240 disciplines, researchers, instructors, librarians and students who rely on Scopus are confident that the odds of missing key publications are greatly reduced. That's why we chose scopus.

Table 1. Citing analysis of the top cited 15 documents.

First Author, Year	Source	Number of citations	Title	Open access
Tarlo et al, 1990	The Journal of Allergy and Clinical Immunology	277	Occupational asthma caused by latex in a surgical glove manufacturing plant	No
Turjanmaa et al,1988	Contact Dermatitis	181	Comparison of diagnostic methods in latex surgical glove contact urticaria	No
Carrillo et al, 1986	Contact Dermatitis	148	Contact urticaria and rhinitis from latex surgical gloves	
Beezhold&Beck, 1992	Archives of Surgery	133	Surgical Glove Powders Bind Latex Antigens	No
Brough et al, 1988	British Journal of Surgery	127	Surgical glove perforations	No
Misteli et al,2009	Archives of Surgery	121	Surgical glove perforation and the risk of surgical site infection	Yes
Dxodds et al,1988	British Journal of Surgery	113	Surgical glove perforation	No
Gerber, et al,1989	Anesthesiology	110	Severe intraoperative anaphylaxis to surgical gloves: Latex allergy, an unfamiliar condition	No
Förström, L.1980	Contact Dermatitis	88	Contact urticaria from latex surgical gloves	No
Partecke et al,2009	Infection Control and Hospital Epidemiology	77	Incidence of microperforation for surgical gloves depends on duration of wear	No
Dalgleish&Malkovsky,1988	British Journal of Surgery	65	Surgical gloves as a mechanical barrier against human immunodeficiency viruses	No
Harnoß, et al,2010	American Journal of Infection Control	64	Concentration of bacteria passing through puncture holes in surgical gloves	No
Wright, et al,1991	JAMA: The Journal of the American Medical Association	63	Mechanisms of Glove Tears and Sharp Injuries Among Surgical Personnel	No
McLeod, G.G.,1989	Journal of Bone and Joint Surgery - Series B	58	Needlestick injuries at operations for trauma. Are surgical gloves an effective barrier?	No
Alenius H, 1991	International Archives of Allergy and Immunology	56	Surgical latex glove allergy: Characterization of rubber protein allergens by immunoblotting	No

According to the results of the bibliometric analysis we conducted with 441 articles, an increase in studies related to surgical gloves was observed between 1990 and 2000, as well as between 2011 and 2021. This indicates the importance that authors have placed on the topic of surgical gloves in terms of sterility. The studies, which initially began with Willian et al. in 1940, have been increasing over time.[8] Based on these data, we predict that there may be an increase in the number of publications in the future. In recent years, there has been a growing number of studies on glove punctures, which are commonly encountered in surgeries, as they contribute to both surgeon and patient mortality and morbidity.[9] The effects of using double gloves on glove punctures have been investigated, and new glove designs have been developed for procedures involving glove punctures.[4,9,10] While sterility is crucial in surgery, multicenter multidisciplinary studies are necessary to evaluate the effectiveness of gloves and develop new preventive measures.

In our study, the articles were predominantly written in English. When looking at the countries represented in the studies, the top three were the USA, United Kingdom, and Germany, in that order. Turkey ranked 11th along with India. We believe that new studies conducted in our country can create awareness and help prevent morbidity and mortality associated with this issue. In their study, Harnoss et al. reported that the microperforation rate of the outer layer was approximately 15%, and approximately 82% of perforations went unnoticed by the surgical team, depending on the duration of glove usage.11 We believe that this issue can be addressed by using more durable gloves or implementing procedures such as changing gloves at regular intervals.

In the articles, medical journals accounted for 84.58%, while nursing journals represented only 6.12%. We believe that there should be an increase in studies related to this topic in nursing journals and the nursing field. Nurses are involved in surgeries, and it is essential for healthcare personnel, including auxiliary staff, to pay attention to sterility before, during, and after the procedure. Considering that surgery is a team effort, maximum importance should be given to sterility by all healthcare personnel. Furthermore, the study examined articles from a total of 21 different scientific fields, including engineering, veterinary science, and environmental sciences.

Most of the publications originated from the University of Virginia, specifically from the University of Virginia School of Medicine in Charlottesville, USA. Richard F. Edlich, affiliated with the University of Virginia, was the most prolific author in this field. Richard F. Edlich, who specialized in plastic surgery, has published hundreds of articles and book chapters throughout his career, focusing

on burn care, wound healing, surgical instrument design, and rehabilitation.[12-14]

The Association of periOperative Registered Nurses (AORN) Journal stands out as the journal with the highest number of publications, with 9 articles. Contact Dermatitis and Journal of Hospital Infection share the top three positions. We believe that the efforts of surgical specialty journals in conducting studies in this area will be significant.

The study by Tarlo et al. (2019) on latex-induced occupational asthma in a surgical glove manufacturing factory appears to be the most cited publication in our research. Tarlo et al. reported in their study that latex should be considered as one of the causes of occupational asthma.[15] When looking at the top three publications on the list, it is notable that they are related to allergic side effects caused by latex gloves.[16-17] As a result, when examining the study data, the increasing number of citations in the Journal of the American Academy of Dermatology stands out.

CONCLUSION

There has been an increasing trend in surgical gloves in recent years. In particular, studies have been conducted on latex glove allergy and surgical site infections. Multidisciplinary studies to be carried out in the future are important, especially in terms of preventing infection during surgery and preventing possible transmission to healthcare workers.

ETHICAL DECLARATIONS

Ethics Committee Approval: Since this was not human or animal study, approval from the ethical committee was not requested.

Informed Consent: Since this was not human or animal study, informed consent was not obtained.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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